

122. (New) The electrode metal material according to Claim 1, wherein said valve metal material is one selected from the group consisting of tantalum, aluminum, titanium, niobium, zirconium, bismuth, silicon, hafnium, a titanium-based alloy containing boron and tin, a titanium-based alloy containing chromium and vanadium, a titanium-based alloy containing vanadium and antimony, and an aluminum-based alloy containing titanium.

123. (New) The electrode metal material according to Claim 1, wherein said valve metal material is aluminum or tantalum.

REMARKS

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

In connection with the "Priority" on page 2 of the Office Action, Applicants note that the parent application, Serial No. 09/381,680, is a national phase application of an international application filed January 22, 1999, and since the parent application was filed within 20 months of the filing date of the first two Japanese priority applications (filed January 23, 1998), Applicants are entitled to claim priority based on these two Japanese applications. Receipt of certified copies of these first two priority applications were acknowledged by the PTO during prosecution of the parent application.

In connection with the restriction requirement, as required by the Examiner, Applicants hereby affirm their election of claims 1-10 and 54-58 with traverse. This election is made while reserving Applicants' rights under 35 U.S.C. § 121 to file a divisional application for the non-elected subject matter.

Applicants note that in addition to claims 11-23 and 59-79, the Group II subject matter should include claim 104, which is still pending in the application, despite the fact that the Office Action Summary page does not acknowledge claim 104.

The restriction requirement is traversed to the extent that Applicants be given an opportunity to rejoin non-elected claims 11-23, 59-79 and 104 upon allowance of the elected subject matter.

Claims 54-58 have been canceled.

Claims 1-3, 5-6 and 9 have been amended in response to the Claim Objections and Claim Rejections under 35 U.S.C. § 112. The claim objections are now considered to be moot.

In order to make claim 7 accord more with U.S. practice, it has been amended to delete the examples of graphite and carbon black, as a result of which new claim 121 has been added to the application.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached pages are captioned "Version with markings to show changes made."

New claims 122-123 have been added the application. Claim 122 is supported by the paragraph bridging pages 13-14 of the specification. Claim 123 is directed to the first two members of the Markush group in claim 122.

The rejection of claims 1-10 and 54-58 under the second paragraph of 35 U.S.C. § 112 is respectfully traversed.

In view of the claim amendments, the only remaining ground for this rejection is based on the Examiner's position that the meaning of "valve metal" is unclear.

The term "valve metal" means a metal having a thin passive layer on the surface of the metal, the passive film being made by oxidizing the surface part of the metal with a rectifying function to stop an electric current (but pass the reverse current through the passive film) toward an electrolyte which is in contact with the valve metal.

Such a valve metal includes, for example, tantalum, aluminum, titanium, niobium, zirconium, bismuth, silicon, hafnium, and alloys including a titanium-based alloy or other alloys containing the metal above, and the like, as recited in new claim 122.

In the present invention, a valve metal such as aluminum is used for electric collectors for both double-layer electrodes in an electric-double layer capacitor, and an electric collector in a secondary lithium battery to utilize the valve function of the metal for the self-healing of current leakage between the current collector and an electrode material including electrode active substances, thus improving self-discharging characteristics.

The patentability of the present invention over the disclosures of the references relied upon by the Examiner in rejecting the claims will be apparent upon consideration of the following remarks.

Thus, the rejection of claims 1, 2, 6-8 and 10 (claims 54-55 having been canceled) as being anticipated by JP 11-121301 is respectfully traversed.

The JP '301 reference was published April 30, 1999, which is subsequent to the filing date of January 22, 1999 for the international application on which the parent U.S. application (Serial No. 09/381,680) is based. Applicants take the position that the rejected claims 1, 2, 6-8 and 10 are supported by the disclosure of the parent U.S. application, and therefore by the disclosure of the corresponding international application, thus overcoming the use of the JP '301 reference as prior art against these claims.

The rejection of claims 1, 2, 4, 6-8 and 10 (claims 54-55 and 58 having been canceled) under 35 U.S.C. § 102(b) as being anticipated by Yamada et al., as well as the rejection of claim 9 under 35 U.S.C. § 103(a) as being unpatentable over this reference, are respectfully traversed.

The Yamada et al. reference (USP 5,723,232) discloses a lithium secondary battery provided with a metal collector made of iron, nickel, cobalt or their alloys, to catalyze carbon graphitization. However, the reference fails to disclose or suggest any valve metal within the meaning of this term as discussed above. More specifically, the use of such a valve metal of the present invention is not suggested by any of the metal materials of the iron group disclosed by Yamada et al.

The rejection of claims 3 and 5 (claims 56-57 having been canceled) under 35 U.S.C. § 103(a) as being unpatentable over Yamada et al. in view of Fauteux et al. is respectfully traversed.

The comments set forth above concerning the Yamada et al. reference are considered to be equally applicable to this rejection.

The Fauteux et al. reference (USP 5,853,917) discloses a passivating layer formed on a carbon surface of a first electrode. However, this passivating layer is different from, and does not suggest a passive layer to be formed on the surface of the valve metal in the presently claimed invention. The passive layer formed on the valve metal in the present invention is steadily present without any reaction between the valve metal and a water component in a small amount which may be present in the non-aqueous electrolyte. Furthermore, carbon particles are present on, or projected from, the

surface of the valve metal in the present invention, thus effectively electrically connecting it with an electrode material thereon or the non-aqueous electrolyte without current leakage.

For these reasons, Applicants take the position that the presently claimed invention is clearly patentable over the applied references.

Therefore, in view of the foregoing amendments and remarks, it is submitted that each of the grounds of objection and rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

Respectfully submitted,

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CLAIMS



1. An electrode metal material for ~~use~~ in an electrode structure in contact with non-aqueous electrolyte, wherein the electrode metal material is a carbon-containing metal material comprising a valve metal material and ~~numerous~~ carbon particles fixed in a surface of the valve metal material and exposed to the surface thereof. C

2. The electrode metal material according to claim 1, wherein said carbon particles are projected from the surface of said valve metal material to expose ~~the~~ ^{said carbon particles from} said surface. C

3. The electrode metal material according to claim 1, wherein the ~~metallic~~ surface of ~~said carbon-containing~~ metal material is coated with a passive film. C

4. The electrode metal material according to claim 1, wherein said electrode metal material is coated with an activated carbon layer to form a double-layer electrode for an electric double-layer capacitor. C

5. The electrode metal material according to claim 1, wherein said electrode metal material is a cathode of an electrolytic capacitor, ~~making contact with non-aqueous electrolyte~~. C

6. The electrode metal material according to Claim 1, wherein said electrode metal material is ~~thin~~ ^a sheet. C

7. The electrode metal material according Claim 1, wherein said carbon particles are formed of conductive carbon particles, ~~such as graphite or carbon black~~. C

8. The electrode metal material according to Claim 1, wherein said carbon particles are activated carbon particles.

9. The electrode metal material according to Claim 1,
wherein said carbon particles have a mean diameter ⁱⁿ ~~of~~ ⁱⁿ the
range of 0.01 to 50 μm .



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